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TO: Examiner David Nhu  
 FIRM: USPTO, Art Unit 2818  
 FACSIMILE No.: (571) 273-1792  
 OUR Ref.: MICRON.165DV1  
 YOUR Ref.: U.S. Appl. No. 10/659,728 filed September 10, 2003  
 FROM: James W. Ausley, Reg. No. 49,076  
 OPERATOR: Amanda Cogar  
 DATE: September 7, 2004

NO. OF PAGES: 9 (incl. cover sheet)  
 TIME:

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Docket No.: MICRON.165DV1

Customer No.: 20,995

## AMENDMENT / RESPONSE TRANSMITTAL

Applicant : HU, Yongjun Jeff  
 Appl. No. : 10/659,728  
 Filed : September 10, 2003  
 For : METAL GATE ENGINEERING FOR  
 SURFACE P-CHANNEL DEVICES  
 Examiner : NHU, David  
 Art Unit : 2818

## CERTIFICATE OF FAX TRANSMISSION

I hereby certify that this correspondence and all marked attachments are being transmitted via facsimile to Examiner David Nhu (S71) 273-1792 on the date shown below:

September 7, 2004

(Date)

James W. Ausley, Reg. No. 49,076

Commissioner for Patents  
 P.O. Box 1450  
 Alexandria, VA 22313-1450

Sir:

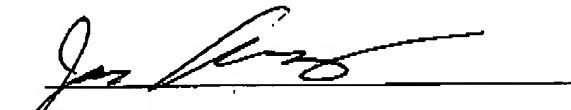
Transmitted herewith for filing in the above-identified application are the following enclosures:

Amendment in six (6) pages.  
 Appendix with one (1) Proposed Replacement Sheet

The fee has been calculated as shown below:

FEE CALCULATION				
FEE TYPE		FEE CODE	CALCULATION	TOTAL
Total Claims	8 - 20 = 0	1202 (\$18)	0 x 18 =	\$0
Independent Claims	1 - 3 = 0	1201 (\$86)	0 x 86 =	\$0
			<b>TOTAL FEE DUE</b>	<b>\$0</b>

Please charge any additional fees, including any fees for additional extension of time, or credit overpayment to Deposit Account No. 11-1410.



James W. Ausley  
 Registration No. 49,076  
 Agent of Record  
 Customer No. 20,995  
 (951) 781-9231

MICRON.165DV1

PATENT

## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : HU, Yongjun Jeff  
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September 7, 2004

(Date)

James W. Ausley, Reg. No. 49,076

D.J.

Foster A  
3/

## AMENDMENT

Commissioner for Patents  
 P.O. Box 1450  
 Alexandria, VA 22313-1450

Dear Sir:

In response to the Office Action mailed July 30, 2004, and further to Applicant's proposed amendment faxed August 17, 2004 in anticipation of the personal interview conducted between the Examiner and the Applicant's undersigned representative on August 24, 2004, please amend the above-referenced application as follows:

**Amendments to the Specification** begin on page 2 of this paper.

**Amendments to the Claims** are reflected in the listing of claims which begins on page 3 of this paper.

**Proposed Amendments to the Drawings** begin on page 4 of this paper. A "Proposed Replacement Sheet" for the sheet of drawings which includes proposed amendments can be found in the attached Appendix following this document.

**Summary of Interview** begins on page 5 of this paper.

**Remarks/Arguments** begin on page 6 of this paper.

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Filed : September 10, 2003

## AMENDMENTS TO THE SPECIFICATION

*DW*  
*Patent A*  
*Z*

*On page 9, please amend paragraphs 0031 and 0032 as follows:*

[0031] The gate stacks 126 over the PMOS devices 112 134 have a desirable higher work function and the gate stacks 126 over the NMOS devices 114 132 have a desirable lower work function thus resulting in a Fermi level closer to mid-gap between the gate stacks 126 and the underlying PMOS 112 and NMOS 114 regions. The gate stacks 126 also exhibit minimal undesirable reaction with adjacent materials in subsequent processing, low internal stress, and good adhesion to adjacent layers in the PMOS 112 134 and NMOS 114 132 devices. Thus, the gate stacks 126 of this embodiment are less likely to physically peal off adjacent layers either during subsequent heat steps or during use of the completed devices employing the improved gate engineering 100.

[0032] The gate engineering 100, as herein described, also obviates the need for a nitrided gate oxide and enables the use of GOx 102. The GOx 102 has a lower dielectric constant than a nitrided gate oxide and thus offers improved transconductance (gm) characteristics for the PMOS 112 134 and NMOS 114 132 devices employing the improved gate engineering 100 in the manner previously described.

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Filed : September 10, 2003

*Enter it*

### AMENDMENTS TO THE CLAIMS

*Please amend the Claims as follows:*

1. (Currently Amended) A semiconductor device comprising:  
a semiconductive substrate;  
a dielectric layer positioned on the semiconductive substrate; and  
an interconnecting layer positioned on the dielectric layer wherein the interconnecting layer comprises a nitrided metal silicide wherein the metal is matched with the a silicide so that the metal is inhibited from reacting with the dielectric layer and also wherein the metal is selected such that selective nitridation of the a metal silicide is selectively nitrided so as to have a lower-lowers the work function of the metal silicide.
2. (Currently Amended) The semiconductor device of Claim 1, wherein the metal is further selected such that the metal silicide and nitrided metal silicide exhibit improved adhesion to the adjacent layers.
3. (Original) The semiconductor device of Claim 1, further comprising a conductive layer positioned on the interconnecting layer such that the dielectric layer, the interconnecting layer, and the conductive layer together define a gate stack.
4. (Original) The semiconductor device of Claim 1, wherein the metal comprises tantalum.
5. (Original) The semiconductor device of Claim 1, wherein the semiconductive substrate comprises silicon and the dielectric layer comprises silicon dioxide.
6. (Original) The semiconductor device of Claim 3, wherein the conductive layer comprises tungsten.
7. (Original) The semiconductor device of Claim 3, wherein the conductive layer comprises cobalt silicide.
8. (Original) The semiconductor device of Claim 3, wherein the conductive layer comprises nickel silicide.

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Filed : September 10, 2003

PROPOSED AMENDMENTS TO THE DRAWINGS

The attached "Proposed Replacement Sheet" includes proposed amendments to Figures 2 and 4. These proposed amendments are being made in response to the objections to the drawings by the Examiner in the Office Action. No new matter is being entered herewith.

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Filed : September 10, 2003

## SUMMARY OF INTERVIEW

### Exhibits and/or Demonstrations

None

### Identification of Claims Discussed

Claims 1 and 2

### Identification of Prior Art Discussed

Background of the Invention (BOI) of subject application and Gardner et al (US 5,854,115)

### Proposed Amendments

Those of the proposed amendment submitted via facsimile to the Examiner on August 17, 2004

### Principal Arguments and Other Matters

The Examiner and the Applicants' representative, James W. Ausley, discussed proposed amendments to Claims 1 and 2 to overcome the rejections under 35 U.S.C. § 112, second paragraph, regarding antecedent support for claim terminology as well as the rejections of Claims 1-8 under 35 U.S.C. § 103(a) over BOI in view of Gardner et al '115.

### Results of Interview

Agreement was reached as to amendments required to overcome the rejections under 35 U.S.C. § 112, second paragraph, as well as 35 U.S.C. § 103(a) which amendments are made by this paper.

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#### REMARKS

The Applicants would first like to thank the Examiner for extending the courtesy of a personal interview to the Applicants' representatives. As discussed in the interview, amendments are made to the subject application by this paper to overcome the rejections under 35 U.S.C. § 112, second paragraph. Regarding the rejection under 35 U.S.C. § 103(a) over Background of the Invention (BOI) in view of Gardner et al (US 5,854,115), as discussed in the interview, the Applicants believe that the currently claimed aspects of "a semiconductor device comprising ... an interconnecting layer ... wherein the interconnecting layer comprises a nitrided metal silicide wherein ... a metal silicide is selectively nitrided so as to have a lower work function" (Claim 1 as currently amended) is not taught or suggested by the art of record. The Applicants thus believe that the subject application as currently amended is now in a condition ready for allowance. The Applicants respectfully request prompt issuance of a Notice of Allowability, however should there remain any further impediments to the allowance of this application which might be resolved by a telephone conference, the Examiner is respectfully requested to contact the Applicants' undersigned representative at the below-indicated telephone number.

Please charge any additional fees, including any fees for additional extension of time, or credit overpayment to Deposit Account No. 11-1410.

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: 9/7/04

By: 

James W. Ausley  
Registration No. 49,076  
Agent of Record  
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(951) 781-9231

## METAL GATE ENGINEERING FOR SURFACE P-CHANNEL DEVICES

Yongjun Jeff Hu

Appl No.: 10/659,728 Atty Docket: MICRON.165DVI

PROPOSED REPLACEMENT SHEET

2/2

Dw  
approved  
9/8/04

FIG. 2

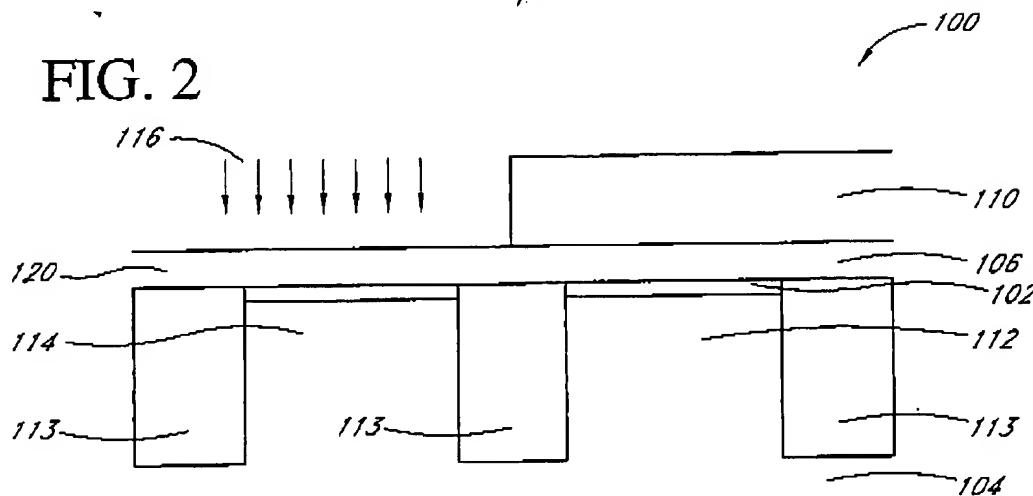


FIG. 3

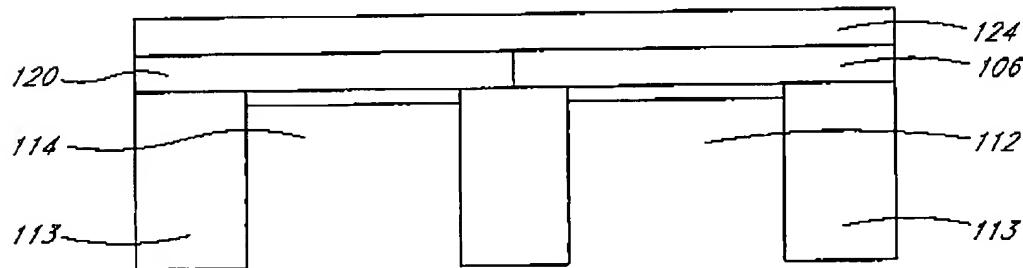


FIG. 4

